

## ERRATA

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Dr. G. H. Miller, the author of "The Impact of Passive Smoking: Cancer Deaths among Nonsmoking Women" requested that a revised Abstract be printed to clarify several points.

### ABSTRACT

In order to obtain an estimate of the impact of passive smoking on cancer mortality, a retrospective study was conducted examining the cancer mortality of nonsmoking wives with no known or minimal exposure in contrast to nonsmoking wives with moderate to life-time exposure to tobacco smoke. The study was based on the data from 906 deceased nonsmoking women who resided in Erie County, Pennsylvania, who were divided into the following three categories:

1. No known exposure
2. Exposed nonemployed
3. Employed (assumed to be exposed to environmental tobacco smoke in the workplace)

The data were analyzed by the retrospective case-control method using cancer deaths as the cases and non-cancer related deaths as the controls. Also, the data from 401 smoking women were used for comparative purposes of the total percentage of cancer deaths among three groups:

1. Nonsmoking, nonexposed women
2. Combined nonsmoking unemployed and employed exposed women
3. Smoking women

The major finding from the study are

1. Only (2.2%) of the total deaths reported among the nonsmoking women with no known or minimal exposure to tobacco smoke were due to cancer of any site.
2. No cases of lung cancer deaths were reported for the nonexposed, nonsmoking women, and eight lung cancer deaths were reported among the nonsmoking women who were exposed to passive smoking. Also, for this small group of 179 nonsmoking nonexposed women, there were no reported cases of breast cancer, genitourinary or lymphatic cancer.
3. Employed nonsmoking women experienced proportionately more cancer deaths (34.3%) than both nonexposed (2.2%) and exposed nonemployed wives (18.9%). The combined groups of exposed nonsmoking wives (nonemployed and employed) contracted 25.5% cancer deaths.
4. Age-adjusted data showed similar trends.
5. Cancer death rates for women smokers was 35.5% of the total deaths of women smokers.

Public health officials should consider requiring that the workplace be free from tobacco smoke since these data imply that passive smoking has a very detrimental effect upon nonsmokers. Also, smokers should be made aware of the potential damage they inflict on others in their home as well as the workplace.

## The Impact of Passive Smoking: Cancer Deaths among Nonsmoking Women

G.H. Miller, Ph.D., CPC

### ABSTRACT

In order to obtain an estimate of the impact of passive smoking on cancer mortality, a retrospective study was conducted examining the cancer mortality of nonsmoking wives with no known or minimal exposure in contrast to nonsmoking wives with moderate (up to 19 years) to lifetime exposure to tobacco smoke. The study was based on the data from 906 deceased nonsmoking women from Erie County, Pennsylvania, who were divided into the following three categories:

1. No known exposure
2. Exposed nonemployed wives
3. Employed wives assumed to be exposed to environmental tobacco smoke in the workplace

The data were analyzed by the retrospective case-control method using cancer deaths as the cases and non-cancer related deaths as the controls. The major findings from the study are

1. Only 2.2% of the deaths reported among the women with no known or minimal exposure to tobacco smoke were due to cancer of any site.
2. No cases of lung cancer were reported for the nonexposed women, and eight lung cancer deaths were reported among the nonsmoking women who were exposed to passive smoking.
3. Employed women experienced proportionately more cancer deaths (35.3%) than both nonexposed (2.2%) and exposed nonemployed wives (25.5%).
4. Age-adjusted data showed similar trends.

Public health officials should consider requiring that the workplace be free from tobacco smoke since these data imply that passive smoking has a very detrimental effect upon nonsmokers both at home and in the workplace.

**Key Words:** passive smoking, lung cancer, breast cancer.

### 1. INTRODUCTION

Whether or not passive smoking is detrimental to health has been extensively considered in the last decade. The first reports

on the effects of long-term exposure to passive smoking appeared in the late 1970s.<sup>1-3</sup> Prior to that time, it was generally assumed that passive smoking was not of much consequence. However, most health professionals were aware of reports of moderate-to-severe eye irritation as well as allergic reactions to tobacco smoke.<sup>1-3</sup> There were also reports of the serious health consequences observed in animals after exposure to high concentrations of tobacco smoke.<sup>1</sup> In the 1970s, research reports discussed the effect of increased respiratory diseases in children of smoking parents.<sup>2</sup> These were followed by the 1980 Surgeon General's report on the harmful effects of cigarettes on the health of smoking women, including research reporting lower birthweights among children of smoking mothers.<sup>4</sup> Passive smoking has been associated with deleterious effects on the fetus.<sup>5,6</sup>

In 1978<sup>7</sup> and 1979,<sup>8</sup> at the Third World Conference on Smoking and Health, Miller<sup>7,8</sup> proposed a passive smoking classification based on three different exposure levels: (1) short-term — a few minutes to a few hours; (2) moderate-term — less than 2 decades; and (3) long-term — 2 decades to a lifetime. He suggested that studying the consequences of long-term exposure provided the best opportunity for observing the effects, if any, of passive smoking. He reported a 4-year earlier average-age-at-death of nonsmoking women exposed to their husbands' cigarette smoke compared with nonsmoking, nonexposed women.

White and Froeb<sup>9</sup> in 1979 reported severe lung dysfunction following long-term exposure to tobacco smoke. Hirayama,<sup>10</sup> Tricopoulos et al.,<sup>11</sup> and Correa et al.<sup>12</sup> noted a two- to threefold increase in lung cancer in exposed wives when compared to nonexposed wives. Gillis et al.<sup>13</sup> and Schmidt et al.<sup>14</sup> have also shown that passive smoking is detrimental to the health of the nonsmoker. Miller,<sup>15</sup> Sandler et al.,<sup>16</sup> and Repace and Lowrey<sup>17</sup> each showed a two- to threefold increase in total cancer deaths following long-term exposure to passive smoking. Garfinkel et al.,<sup>18</sup> who had previously found no statistically significant evidence of the detrimental effects of passive smoking, now reports a two- to threefold increase in lung cancer.<sup>19</sup> Wald et al.<sup>20</sup> and Pershagen et al.<sup>21</sup> most recently have provided support for the hypothesis that passive smoking increases lung cancer incidence, largely among spouses. Two reports provide a detailed review of the research on passive smoking, noting its detrimental effects: the Surgeon General<sup>22</sup> recommended a smoke-free environment, and the National Academy of Sciences<sup>23</sup> recommended no smoking in the home environment of children.

In order to obtain additional information on the effects of passive smoking, this study compared different levels of environmental tobacco smoke exposure of married nonsmoking

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women with cause of death. The causes of death included in the study were the usual causes of death such as cardiovascular, cancer, and respiratory diseases but excluded traumatic deaths such as accidents, suicides, and homicides. Men were not included in this study since so many men are exposed to environmental tobacco smoke in the workplace.

## II. MATERIALS AND METHODS

### A. The Population

The population of Erie County, which includes Erie, the third largest city in Pennsylvania, was 263,654 in 1970. It is primarily a middle income population (the average family income for 1970 was listed as \$9,380) with a low migration rate of 7% for the 1950 to 1970 time period as reported by the Pennsylvania Department of Commerce.

### B. Methodology

The Northwestern Pennsylvania Study on Smoking and Health (NPSSH) began to gather data in 1973 on the smoking habits of deceased male and female residents in Erie County by interviewing the decedents' next of kin. Death notices for the years 1972 through 1982 were obtained from the local newspaper, which lists the names of approximately 95% of deceased Erie County residents along with information on surviving relatives.

Telephone numbers of one to three surviving relatives were obtained for approximately 85% of the death notices reported in the newspaper. Deaths from accidents, suicides, congenital anomalies, and persons younger than 30 years of age were not included because an age bias is introduced when those classified in these categories have their lives curtailed and therefore would not provide an accurate estimate of the age at which cancer actually occurs for the passive smoking-exposed women. Because of the reduced life expectancy, the inclusion of accidents and suicides would lower the incidence of cancer since those in the lower age cohorts might have contracted some type of cancer had they lived long enough. These individuals comprised about 10% of the total deaths.

A questionnaire designed for telephone interviews was constructed with the assistance of the local branches of the American Cancer Society, the American Heart Association, the American Lung Association, and by smoking and health experts in the Pennsylvania Department of Health. A more detailed description of this questionnaire has been published.<sup>13</sup>

Interviewers explained the purpose of the study to the identified surviving relatives and solicited their cooperation. Information was collected from them on each decedent's cause of death, age, occupation (including information on whether or not the wife worked outside the home), exposure to known sources of pollution (including environmental tobacco smoke), smoking history, and whether or not the spouse and parents

smoked. The interviews were conducted by the director of the study and by interviewers trained by him.

The questionnaire was revised in 1975, and additional items were included to obtain more complete information on a spouse's smoking habits such as type and quantity of tobacco used, details on smoking cessation, the age at the time of death and the cause of death, the current age if living, the year or decade of death if deceased. Information on whether any other members of the household smoked was also added.

Detailed data on passive smoking from the revised questionnaire were gathered on the deceased from 23 months in the years 1975, 1976, 1979, and 1980; these were the only data considered in this study. Due to logistical problems, the interviews for deaths occurring in other months were not completed at that time. The total number of deaths among residents of Erie County for these 4 years (Pennsylvania Department of Health) was 10,131 (5478 men and 4653 women). Among the 3538 relatives contacted, 3361 (95%) provided information on 1863 men and 1498 women. Of the 1498 deceased women for whom information was obtained, smoking exposure histories were available for 1423 — 906 nonsmoking wives, who are the subjects considered in this paper, plus data on 401 smokers. Of the remaining 116 deceased nonsmoking women, 63 never married and 53 did not have sufficient information on passive smoking to include in this study. For example, the statement that a husband was a smoker was not considered sufficient evidence if details on amount and type of tobacco use were unavailable, resulting in the exclusion of the wife from this study. These data are summarized in Table I.

In this study, a nonsmoker was defined as a person who had smoked fewer than 20 packs of cigarettes during his or her lifetime. A nonsmoking, nonexposed wife was one who had no known reported exposure to tobacco smoke from any source or minimal exposure (only occasional exposure to pipe, cigar, or cigarette smoke). A nonemployed exposed wife was one who was exposed to cigarette smoke by a family member

**Table I**  
Total Deaths from All Causes, Total Cancer Deaths, and Number of Interviews from the Erie County Population Data Base for the Years 1975, 1976, 1979, and 1980

	All causes	All cancer	Total interviews	Interviews passive smoking	Interviews used in study
Men	5,478	1,116	1,863	1,793	
Women	4,653	995	1,498	1,423	906*
Total	10,131	2,111	3,361	3,216	

\* This figure includes only nonsmoking women with detailed information on passive smoking exposure. It excludes 401 smoking wives and 116 who were never married, single, or of uncertain passive smoking status.

(husband, children, or relatives) or a nonfamily member, or had reported long-term exposure to smoky rooms in non-employed activities outside the home. An employed wife was identified by a surviving relative as a person engaged in an occupation outside the home for more than 3 years.

In order to insure a clearly defined category for nonexposure, all those who may have had any potential moderate-to-heavy exposure were eliminated from this category. Therefore, those not included in the nonexposed spouse category, in addition to the 401 smoking women, were (1) women who were married at any time to a smoker; (2) women exposed by family or friends or exposed in nonemployed activities; (3) all non-smoking employed women.

Although some nonexposed individuals might have been eliminated by these definitions, the nonexposed category as defined here is as free as possible from the inclusion of those who may have been exposed for longer periods of time. The nonsmoking wives were categorized in the following three groups based upon the information reported in the telephone interviews with relatives:

1. NX — nonexposed (no known or only minimally exposed) wives
2. ENE — exposed nonemployed wives
3. EW — Employed wives who were assumed to have some exposure at work

The data were analyzed using the retrospective case control techniques described by Fleiss.<sup>24</sup> The "cases" were defined as deaths (among nonsmoking wives) due to cancer of any kind while the "controls" were noncancer deaths among nonsmoking wives. These deaths included cardiovascular, respiratory, kidney, and other noncancer diseases, but excluded traumatic deaths such as accidents and suicides.

The classification of the cause of death as recorded on the death certificate was provided by the ICD (International Classification of Diseases) codes listed on computer printouts provided by the Pennsylvania Department of Health. The causes of death reported by the next of kin were not used since the ICD codes are considered more accurate. However, the information provided by the surviving relatives was very close to the ICD codes when comparison was made between the next of kin's report of the cause of death given during the interview and the ICD (Death Certificate) disease designation. Details on these data will be reported separately.

In order to be sure that all those classified as having no known exposure to carcinogenic compounds of tobacco smoke were classified correctly, very close relatives of the deceased were located and interviewed if the first interviewee was not a close relative, or close relatives were interviewed again to obtain greater accuracy in the classification of the nonexposed. During this interviewing, it was discovered that two women classified as nonexposed who died of breast cancer were ac-

tually exposed to cigarette smoke by their husbands and children. This reduced the total cases of cancer among nonexposed women from six to four.

Because of the small numbers with different types of cancer, only the major cancer categories were considered as noted in the standard International Classification of Diseases: Oral (140–149), Digestive tract (150–159), Respiratory (160–163), Breast (174), Genitourinary (180–189), Lymphatic (200–209), and All Other Cancer Sites.

Although specific details on cancer deaths due to smoking are not considered in the present study, a comparison was made with the nonexposed (NX), the exposed nonsmokers (ENE and EW), and smokers (employed and nonemployed) to provide comparisons between the nonexposed, exposed nonsmokers, and smokers.

In order to check for potential bias due to age, the data were age adjusted for all cancer causes and for the major categories of cancer: oral, breast, lung, respiratory, genitourinary, and lymphatic.

### III. RESULTS

Analysis of the data in the two by three contingency table (Table II—two categories: cancer cases and noncancer cases compared with the three categories: NX (nonexposed wives), ENE (exposed nonemployed wives), EW (employed wives))

**Table II**  
Deaths among Nonexposed and Exposed Nonsmoking Wives

	Cancer deaths	Noncancer deaths	Total deaths	Percent cancer deaths
Nonexposed:				
(1) nonemployed	4	175	179	2.2
Exposed:				
(2) nonemployed	78	334	412	18.9
(3) Employed	108	207	315	34.3
Total	190	716	906	21.0

Chi square for above 3 by 2 matrix (2 DF) = 72.64

Chi square evaluations for 2 by 2 comparisons (1 DF)

		Odds ratio	Chi square
(1) vs (2)	(Nonexposed vs exposed nonemployed wives)	10.2	29.0
(1) vs (3)	(Nonexposed vs. employed wives)	22.8	66.9
(2) vs (3)	(Exposed nonemployed wives vs. employed wives)	2.2	22.3
(1) vs (2) + (3)	(Nonexposed vs. exposed nonemployed and employed wives)	15.0	47.2

showed a Chi Square value of 72.64 with 2 degrees of freedom ( $p \ll 0.01$ ).

Table II also shows four different comparisons of the three subgroups: (1) nonexposed wives (NX) with exposed nonemployed wives (ENE); (2) nonexposed wives (NX) with employed wives (EW); (3) exposed nonemployed wives (ENE) with employed wives (EW); and (4) nonexposed wives (NX) compared with the combination of exposed nonemployed wives (ENE) and employed wives (EW). The data from Table II show that exposure to environmental tobacco smoke is associated with increased cancer mortality, resulting in an odds ratio of 10.2 when comparing nonexposed wives with nonemployed wives; an odds ratio of 22.8 when comparing nonexposed wives with employed wives; an odds ratio of 2.2 when comparing exposed nonemployed wives with employed wives; and an odds ratio of 15.0 when comparing nonexposed wives with exposed nonemployed wives and employed wives.

Proportionally far fewer nonsmoking nonexposed wives died of cancer than the exposed wives. The comparison of the exposed nonemployed wives with employed wives also showed highly significant excesses in cancer mortality among the employed women.

Table III shows the mortality from cancer by primary site for the three different exposure groups (NX — nonexposed wives; ENE — exposed nonemployed wives, and EW — employed wives) for the major categories of cancer (oral, digestive tract, breast, genitourinary, lymphatic, and other sites). There were no reported deaths from oral, lung, breast, genitourinary, and lymphatic cancer among the 179 deaths within the nonexposed women. One death from digestive cancer and three deaths from "other" cancers were reported for the nonexposed. Eight deaths due to lung cancer were reported among the 727 deaths of exposed (nonemployed and employed) nonsmoking wives.

Figure 1 shows the percentage of deaths due to cancer among nonexposed wives, exposed wives (both nonemployed and employed), and smoking wives. Although smoking wives are not considered in detail in the present study, the preliminary data are provided here for comparative purposes:

1. Nonexposed nonemployed wives — 2.2%
2. Exposed (employed and nonemployed) wives — 25.5%
3. Smoking wives (employed and nonemployed) — 35.3%

In addition, the data for cancer deaths were age adjusted by the standard age-adjusting methods. The cancer deaths were adjusted to cause distribution of all female decedents in the years considered in this study (1975, 1976, 1979, 1980) from Erie County based on the data from the Pennsylvania Department of Vital Statistics. The results of the expected and observed were analyzed by the two-way probability based on the Poisson distribution and are reported in Table IV. The Poisson distribution was used since the nonexposed group had so few cases. Table IV shows the results after age adjusting for all cancer cases, digestive cancer, and the results for the combination of oral, lung, breast, genitourinary, and lymphatic cancers which appear to be associated with effects of passive smoking.

#### IV. DISCUSSION

While many epidemiologists prefer to conduct prospective studies, the retrospective study has the advantage of allowing one to obtain estimates in a short time. Thus, this type of a research provides mortality data related to information on the smoking habits of the deceased.

Because nonsmoking women may be exposed to numerous sources of tobacco smoke, this study tried to eliminate as many of the sources of tobacco smoke exposure as possible in order to more accurately classify women into a "pure" nonexposed category. It is probable that persons in this "pure" category have had some small exposures to tobacco smoke during their lives, because minimal exposure is difficult to avoid.

The present study was designed to obtain smoking history data on all nonsmoking wives who died during the specified years. While it is difficult, if not impossible, to obtain data on all members of a population, there is little reason to believe that the 23-months' sampling of the 4-year population was

Table III  
Major Types of Cancer for Nonexposed and Exposed Nonsmoking Wives

Type of cancer	Oral	Digestive tract	Respiratory	Breast	Genitourinary	Lymphatic	Other sites	Total	Average age at death
ICD classification	140—149	150—159	160—163	174	179—185	200—209			
NX	0	1	0	0	0	0	3	4	84.5
ENE	0	28	3	14	9	8	16	78	71.1
EW	0	38	5	25	14	10	16	108	67.8
Total	0	67	8	39	23	18	35	190	

Note: ICD: International classification of disease; NX: nonexposed wives; ENE: exposed nonemployed wives; EW: employed wives; Total: exposed and nonexposed wives.

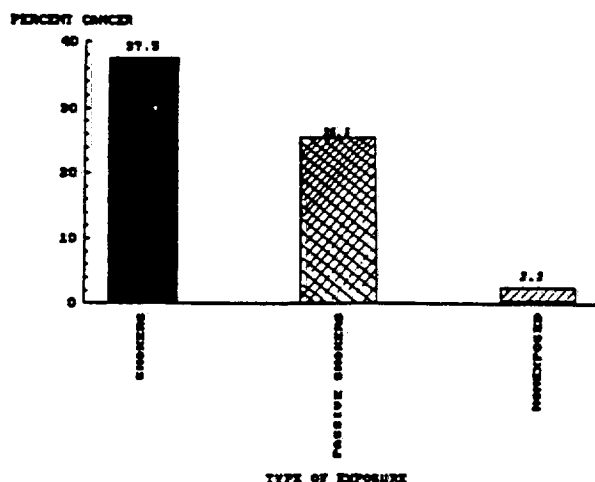


FIGURE 1. A comparison of mortality rates of smokers, passive smokers, and the nonexposed.

**Table IV**  
Analysis Using Age-Adjusted Values for Cancer Sites (All Cancer, Digestive, and Passive Smoking-Associated Cancer) for the Three Major Nonsmoking Groups

Disease	Group	EXP	OBS	Probability
All cancer	Nonexposed	24.0	4	0.00002
	Exposed nonemployed	73.1	78	NS
	Exposed employed	70.6	108	0.001
Digestive Cancer	Nonexposed	9.3	1	0.002
	Exposed nonemployed	24.2	28	NS
	Exposed employed	20.4	38	0.01
Passive smoking-associated cancer	Nonexposed	9.2	0	0.0002
	Exposed nonemployed	35.7	34	NS
	Exposed employed	38.9	54	0.1

biased in the types of cancer deaths that would have occurred during these years. Analysis of the data of previous nonrespondents showed the same basic distribution of cancer deaths as the analysis of original respondents. Therefore, the data from this population study are likely to be representative of the actual population.

These data provide evidence that nonsmoking women exposed to cigarette smoke (generated by smoking husbands,

other smokers in the household, or in outside activities) has a higher probability of dying of cancer of all kinds than women who have no known exposure, i.e., cancer mortality in nonsmoking Erie County wives with no known exposure to tobacco smoke is very low — only 2.2% vs. 25.5% for exposed women and 35.3% for smoking wives (Figure 1).

The data imply that the absence of passive smoking could lead to even lower rates of cancer mortality for the total population. Thus, these data indicate that passive smoking is very detrimental to the health of the nonsmoker.

The total proportion of deaths due to cancer for the 401 smoking and 906 nonsmoking wives in this study is 23.9%. This result is close to the proportion of deaths due to cancer for women in Erie County (21.8%) for the years considered in the study as reported in the Pennsylvania Department of Health — Division of Vital Statistics. This agreement suggests that the data are representative of the total population.

The observation that the nonsmoking employed wives had an odds ratio of 2.2 of dying of cancer when compared with exposed nonemployed wives suggests that workplace exposures may involve important hazards in addition to, or apart from, tobacco smoke. Over 80% of the employed wives in this study were either office workers, in sales occupations, teachers, or nurses, who (aside from the nurses) should have had little contact with carcinogenic agents other than tobacco smoke. The doubling of the rates of cancer for employed women compared with nonemployed women are in agreement with the data of Repace and Lowry<sup>25</sup> and the estimates made by Wells.<sup>26</sup> It may be that work place passive smoking exposure is higher than at home. Another possible explanation is that the employed wives may receive additional tobacco smoke exposure from smokers at home such as from their spouse, i.e., their husbands may be more likely to be smokers or heavy smokers.

Also of interest is the observation that only 8 deaths due to lung cancer were reported among the total of 727 passively exposed nonsmoking wives. Thus passive smoking does not result in large numbers of lung cancer cases when compared to active smoking. This difference is in agreement with the results of several studies by Hirayama,<sup>10</sup> Tricopoulos et al.,<sup>11</sup> and Correa et al.<sup>12</sup> showing two- to threefold increases in lung cancer for exposed vs. nonexposed wives and a much larger increase for smokers. In addition, a study by Miller<sup>27</sup> on the Amish — a nearly completely nonsmoking population — showed no lung cancer cases among either male and female nonsmokers for the Lancaster County, Pennsylvania, Amish for the 1970 to 1980 decade.

There were no reported deaths from lung cancer, breast cancer, genitourinary, or lymphatic cancer among wives with no known exposure to tobacco smoke among the total of 179 deaths in the nonexposed category. This contrasts with the distribution of cancer mortality for women in the general population of Erie County for the years under consideration: lung cancer — 12.7%; breast cancer — 20.7%, and lym-

phatic cancer — 8.7%. These Erie County percentages of cancer causes by site are close to the national averages. Thus it appears that the types of cancer reported in the nonexposed group are very different from the types of cancer reported for both passive smoking and active smoking groups. While it has been shown that passive smoking causes some lung cancer cases, the amount is small compared with that of those who smoke.

Whether or not breast cancer is caused by active or passive smoking has become a controversial issue. Previously, it was thought that breast cancer was not active-smoking related. For example, no editions of the U.S. Surgeon General's Reports from 1964 to 1989 show any subsections devoted to active smoking and breast cancer. However, the Bibliography of Smoking and Health and Index Medicus provides reports of many studies on the topic of smoking and breast cancer. The most recent studies appear to be equally divided between those concluding that there is no overall positive association with active smoking and breast cancer<sup>28-31</sup> and those that conclude a positive and, in some cases, a significant association between active smoking and breast cancer.<sup>32-35</sup>

It has been only recently that studies have taken into account the potential effect of passive smoking and its possible association with breast cancer. Two of the most recent studies were completed by Sandler et al.<sup>36</sup> and Horton.<sup>37</sup> Two other major cancer categories have been reported as being associated with passive smoking exposure — lymphatic cancer, by Wells;<sup>29</sup> and cervical cancer, by Slattery et al.<sup>38</sup> The data from the present study agree with the studies noted above.

The possibility of passive smoking being associated with cancer sites was also verified by the highly significant values obtained after age adjusting for total cancer, digestive cancer, and the combined passive smoking-related cancer sites (refer to Table IV).

Since many studies during this decade have come to the conclusion that breast cancer is not smoking related, this new data might appear to be questionable. However, past studies failed to allow for such passive smoking categories as employed women and others smoking in the household. Therefore, the results of the NPSSH study should provide a more accurate estimate of passive smoking exposure.

A recent article by Bailar and Smith,<sup>39</sup> pointing to the continued increase in cancer mortality despite our apparent gains in early identification, as well as improvements in the treatment of cancer, shows that cancer is still increasing in the population. It may be that the cumulative long-term effects of both passive smoking and active smoking are continuing to have an impact on this increased cancer mortality. These issues have important implications for both the home and the workplace.

More research is needed to validate these observations. New studies require:

1. Better estimates of exposure to passive smoking. The nonsmoking category should exclude employed women, women exposed at home by individuals other than their spouse, and long-term exposure in outside nonemployed activities, as well as exposure at home by their spouse.
2. Long-term exposure information — preferably a minimum of 3 decades-to-lifetime exposure. Studies involving a few weeks or months or even a few years of exposure are inappropriate for an analysis of the true long-term impact of passive smoking.
3. Large enough samples to provide valid data.

For comparative purposes with the results of this study, the author would like to see more population studies instead of nonrandom or nonpopulation based samples in order to overcome the biases that are inherent in these types of sample designs.

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